

STATE OF SOUTH CAROLINA
BEFORE THE PUBLIC SERVICE COMMISSION
DOCKET NO. 2018-72-E

In the Matter of:)	
)	
Application of Duke Energy)	COMMENTS OF SOUTH CAROLINA
Carolinas, LLC for Approval of)	COASTAL CONSERVATION
Rider 10)	LEAGUE AND SOUTHERN
)	ALLIANCE FOR CLEAN ENERGY
)	

The South Carolina Coastal Conservation League (“CCL”) and Southern Alliance for Clean Energy (“SACE”) hereby submit the following comments on Duke Energy Carolinas, LLC’s (“DEC” or “the Company”) application for approval of its demand-side management (“DSM”) and energy efficiency (“EE”) rider for 2019 (“Rider 10”).¹

INTRODUCTION

CCL and SACE generally support approval of DEC’s application for Rider 10. The Company is delivering cost-effective programs that yield substantial energy savings. The performance of DEC’s DSM/EE portfolio has improved markedly, and in 2017 achieved record energy savings equivalent to 1.07% of its prior-year retail sales.² We commend this increase in savings, and also commend DEC for taking steps to maintain

¹ The proposed Rider 10 consists of components calculated under DEC’s “modified Save-a-Watt” (“SaW”) cost-recovery and incentive mechanism approved in Docket No. 2009-226-E, as well as components calculated under the mechanism approved in Docket No. 2013-298-E. The Company also requests recovery of costs associated with its Interruptible Service and Stand-By Generator programs (“Existing DSM Programs”) as a separate component of Rider 10.

² Net energy savings as a percentage of prior-year retail sales are calculated based on the Company’s 2017 reported net savings of 906.9 GWh at the generator (across both its North Carolina and South Carolina service territories), adjusted for an average line loss rate of 6.2187% (DEC response to SACE 2-6), producing savings of 853.8 GWh at customers’ meters. The 2016 retail sales figure of 79,643 gigawatt-hours (“GWh”) in both North Carolina and South Carolina was reported by the U.S. Energy Information Administration on Form 861 Data, Table 10.

the cost-effectiveness of its portfolio and introducing new programs to broaden its offerings and encourage greater customer participation.

Despite the solid performance of DEC's efficiency portfolio in 2017, key factors threaten to undermine further progress toward higher energy savings:

1) The Company's energy savings rely too heavily upon lighting and behavioral programs, largely missing opportunities for comprehensive home and commercial building performance improvements and high-efficiency industrial systems. In addition, DEC is likely overstating the lifetime savings and future net benefits of its lighting measures, given new federal efficiency standards for light bulbs that are scheduled to go into effect in 2020. The Company may also be significantly over-estimating the new savings achieved from the My Home Energy Report program, its chief residential behavior program, by not taking into account persistence of savings for some time after participants stop receiving the Report.

2) There is significant untapped efficiency potential in DEC's service territory that its existing programs are not reaching. In particular, there is inadequate promotion of longer-lived major measures or comprehensive treatment of buildings. The Residential Smart \$aver Energy-Efficiency Program, through which DEC promotes major measures such as heat pumps, central air conditioners, heat pump water heaters, attic insulation, and duct sealing, is forecast to produce only about 1% of its total savings in the residential sector. In addition, there is a strong need for increased investment in lower-income communities and in programs that reach rental units.

3) The already high rate of commercial and industrial customers opting out of DEC's DSM/EE programs and riders increased again in 2017, hampering potential savings in these energy-intensive sectors.

4) Insufficient planning to offset what will be a significant loss of savings potential in residential lighting, once the 2020 federal EISA efficiency standards go into effect. DEC's filing does not demonstrate how the Company will make up for the loss of lighting savings following full implementation of the federal efficiency standards for light bulbs.

The following comments review the performance of DEC's DSM/EE portfolio, address the above concerns, and provide recommendations designed to increase DEC's achievement of cost-effective energy savings in future years. CCL and SACE are eager to continue to work with DEC, the South Carolina Office of Regulatory Staff, and other stakeholders in a collaborative process to implement these recommendations and ensure that the Company's programs continue to save energy and money for South Carolinians. To this end, we recommend ways to improve the Collaborative.

DEC'S ENERGY SAVINGS AND PROJECTIONS

A. DEC delivered its highest-ever energy savings in 2017, for the first time achieving its annual savings target in the Merger Settlement.

DEC delivered its highest-ever DSM/EE portfolio savings in 2017, saving 853.81 gigawatt-hours ("GWh").³ This level of savings corresponds to 1.07% of prior-year retail sales—meeting the annual energy savings target that the Company agreed to in a

³ DEC reports energy savings as "Net at Plant" or at the generator level.

settlement agreement entered into in connection with the then-proposed merger of Duke Energy and Progress Energy (“Merger Settlement”).⁴

DEC’s 2017 savings continued a pattern of out-performing the Company’s projections. In 2017, DEC’s actual energy savings of 854 GWh exceeded its projected savings of 608 GWh by 39.8%. As shown in in Table 1, below, this discrepancy is the continuation of a trend of underestimating program performance by about 40% annually.

Table 1. DEC Projected vs. Actual Savings

Vintage Year	Projected Savings (GWh)⁵	Actual Savings (GWh)⁶	Actual-to-Projected Variance (%)
Vintage 1 (2010)	234	479	105%
Vintage 2 (2011)	257	533	107%
Vintage 3 (2012)	382	506	32%
Vintage 4 (2013)	567	442	(22%)
Year 2014	406 ⁷	553	36%
Year 2015	470 ⁸	681	45%
Year 2016	598 ⁹	831	39%
Year 2017	608 ¹⁰	854	40%

DEC’s 2019 planned portfolio of DSM/EE programs has a number of positive elements. First, the new annual savings DEC forecasts its programs will produce in 2019 are equal to about 0.95% of total forecast sales and 1.38% of sales to non-opt-out customers – both significant milestones. Second, the program portfolio is very cost-effective, producing \$2.46 in supply-cost savings for every dollar DEC has spent. Since

⁴ The Merger Settlement with CCL and SACE, as well as Environmental Defense Fund, calls for annual energy savings of at least 1% of prior-year retail sales beginning in 2015 and cumulative savings of at least 7% over the period from 2014 through 2018, and was approved by the Commission in Docket No. 2011-158-E.

⁵ Direct Testimony of Raiford L. Smith, Docket No. 2009-226-E at 10.

⁶ Docket No. 2015-89-E, Exhibit 2 for vintage 2010-2014; Docket No. 2017-65-E for vintage 2015 and 2016; NCUC Docket E-7, Sub 1164, Evans Ex. 1, p. 4 for year 2017.

⁷ Testimony of Timothy Duff, Docket No. 2013-298-E at 38.

⁸ Calculated from estimated System Energy Reduction data for each energy efficiency program in Docket No. 2014-334-E, Year 2015, Exhibit 2 at 38.

⁹ Testimony of Robert P. Evans, NCUC Docket No. E-7, Sub 1125 at 22.

¹⁰ Testimony of Robert P. Evans, NCUC Docket No. E-7, Sub 1130 at 29.

2014, DEC's efficiency programs have saved enough energy at the time of system peak to eliminate the need for the equivalent of more than four natural gas "peaker" power plants. Third, the portfolio includes a wide range of efficiency measures and programs. Fourth, there are some national state-of-the-art program design features, particularly the Company's recent launch of a midstream channel for promoting non-residential HVAC, lighting, food service, and IT measures.

DEC must continue to improve its energy-savings performance, however, in order to meet its five-year cumulative savings target of 7% by 2018. As noted above, the Company projects that it will fail to meet the Merger Settlement EE targets in upcoming years. Despite the improvement in energy savings in 2017 to 1.07% of prior-year retail sales, the Company projects an 8.5% decline in energy savings to only 781.3 GWh in 2019. According to its own projections, the Company will fall short of the five-year cumulative energy savings of 5.0% required by the Merger Settlement.

B. DEC increased savings across program sectors in 2017.

DEC increased savings from both residential and non-residential EE programs in 2017. Residential programs achieved 499 GWh of savings in 2017, while nonresidential programs achieved 405 GWh of savings. These results are summarized in Table 2, below, which also presents energy savings by program and for the total portfolio. CCL and SACE applaud the Company for increasing its savings and look forward to a continuation of this upward trend.

Table 2. DEC EE Program Energy Savings in 2016 and 2017¹¹

Residential Programs	2016 Savings (GWh)	2017 Savings (GWh)	% Change
Appliance Recycling	0.2	n/a	n/a
Energy-Efficiency Education Program for Schools	6.4	5.9	-7.8%
Energy-Efficient Appliances and Devices	120.2	141.3	17.6%
Residential Smart Saver EE Program	6.3	8.5	34.9%
Income-Qualified EE and Weatherization Assistance	4.3	5	16.3%
Multi-Family Energy Efficiency	15.2	19	25.0%
Residential Energy Assessments	7.4	8.1	9.5%
My Home Energy Report	283.6	311.4	9.8%
Residential Total	443.6	499.2	12.5%
Non-Residential Programs			
Smart Saver Customer Technical Assessments	17	15.6	-8.2%
Smart Saver – Custom Rebate	52.2	41.8	-19.9%
Smart Saver – Food Service Products	3.8	2.3	-39.5%
Smart Saver – HVAC	3.3	3.4	3.0%
Smart Saver – Lighting	167.3	230	37.5%
Energy-Efficient Pumps and Drives Products	2.5	3.5	40.0%
Energy-Efficient ITEE	2.5	0.03	-98.8%
Smart Saver – Process Equipment	0.3	0.6	100.0%
Smart Saver – Performance Incentive	n/a	0.12	n/a
Small Business Energy Saver	85.7	97.5	13.8%
Smart Energy in Offices	16.8	10.3	-38.7%
Business Energy Report	5.6	0.04	-99.3%
EnergyWise for Business	0.7	n/a	n/a
Non-Residential Total	357.7	405.2	13.3%
PORTFOLIO TOTAL	801.3	904.4	12.9%

¹¹ NCUC Docket No. E 7, Sub 1164, Evans Exhibit 1, pp. 3-4 (South Carolina retail allocation factor is 26.9%).

C. DEC's 2017 savings were driven by behavioral and lighting programs, which could compromise future savings growth.

DEC's record level of residential energy savings in 2017 was driven largely by the My Home Energy Report ("MyHER") behavioral program, which delivered roughly 62% of the Company's total residential energy savings and 34.4% of total savings in 2017. Savings from behavioral programs do not produce the same kinds of deep and long-lasting savings that can be achieved from more comprehensive retrofit programs (though as discussed below, savings from MyHER likely persist in ways not accounted for by DEC). CCL and SACE again recommend that the Company use the MyHER program as an opportunity to attract customers to other EE and DSM programs that can achieve deeper and longer-lasting savings.

The Energy Efficient Appliance and Devices Program, which focuses on residential lighting, remains one of the Company's strongest programs. In 2017, the program was responsible for 141 GWh of energy savings—more than 15% of the total portfolio savings. DEC's six remaining residential programs together only generated 46.5 GWh of additional savings, or 5% of the total portfolio savings, indicating that DEC's efficiency portfolio is currently too reliant on behavioral and lighting programs to generate savings. This over-reliance could hamper the growth of energy savings in the future, particularly given the changes to federal lighting efficiency standards discussed below. DEC's 2016 potential study found that under the enhanced scenario, the HVAC EE program could deliver 34% of the Company's potential savings in 2021.¹² The Company should continue to look for ways to use its entry-level behavior

¹² Nexant, Inc., *Duke Energy South Carolina DSM Market Potential Study* (Dec. 19, 2016) ("Nexant Study") at 97. The study, along with a similar study for North Carolina, was provided to participants in

and lighting programs to drive customer demand for more comprehensive retrofits and deeper long-term savings.

Similarly, a handful of DEC's programs are delivering the vast majority of savings in the non-residential sector. Although savings from DEC's non-residential portfolio increased to 405.2 GWh in 2017, the increase was driven largely by a 37.5% increase in the Smart Saver Lighting program to 230 GWh, or 56.8% of total non-residential savings. Many of the remaining Smart Saver programs have stagnated or even declined due to a high percentage of opt-outs. For example, the Smart Saver Custom Rebate program achieved savings of 41.8 GWh in 2017, a 20% decline from the previous year. The Company should continue to look for additional ways to retain and attract participants from this energy-intensive customer class.

CCL and SACE encourage DEC to continue working to increase participation across all customer segments by improving cross-participation in programs and by implementing new residential and non-residential EE programs, as discussed below.

D. DEC's DSM/EE portfolio remains highly cost-effective, significantly reducing the system costs borne by customers.

DEC's DSM/EE portfolio has been cost-effective from day one. By definition, "cost-effective" means that the benefits (that is, the avoided cost savings) of the programs exceed the costs. As indicated by the Utility Cost Test ("UCT") net benefits shown in Table 3, below, DEC's efficiency and DSM programs have produced net system cost savings of hundreds of millions of dollars just in the last three years.¹³

DEC's Carolinas Energy Efficiency Collaborative. The HVAC EE program is referred to as SmartSaver in the report.

¹³ In response to a data request, DEC provided UCT scores as well as costs and benefits for each program for 2014-2017. Worksheet C, excerpted from DEC Response to CCL/SACE First Data Request No. 3a &

**Table 3. Net System Cost Savings of DEC's Programs
(UCT Net Benefits in \$M)**

Program	2014	2015	2016	2017
Appliance Recycling Program	\$0.24	\$0.45	\$0.16	N/A
Energy Efficiency Education	\$3.10	\$0.72	\$1.79	\$1.72
Energy Efficient Appliances and Devices	\$37.28	\$40.03	\$61.48	\$79.97
HVAC Energy Efficiency	\$2.19	\$2.01	\$0.19	\$2.01
Income Qualified Energy Efficiency and Weatherization Assistance	(\$0.25)	(\$0.56)	(\$2.26)	(\$2.61)
Multi-Family Energy Efficiency	\$3.83	\$5.74	\$6.92	\$10.72
Energy Assessments	\$9.13	\$8.93	\$4.88	\$4.72
My Home Energy Report	\$3.86	\$8.07	\$11.17	\$9.62
PowerManager	\$41.66	\$47.68	\$50.56	\$58.34
Non Residential Smart Saver Custom Technical Assessments	\$5.33	(\$0.32)	\$7.86	\$8.41
Non Residential Smart Saver Custom Energy Management Information Services	\$41.30	\$46.17	\$33.25	\$29.73
	(\$0.07)	-	-	-
Non Residential Smart Saver Energy Efficient Food Service Products	\$1.28	\$0.94	\$2.21	\$1.32
<i>Non Residential Smart Saver Energy Efficient HVAC Products</i>	\$4.33	\$5.47	\$2.08	\$2.09
Non Residential Smart Saver Energy Efficient Lighting Products	\$33.78	\$32.64	\$85.62	\$134.30
Non Residential Energy Efficient Pumps and Drives Products	\$3.01	\$1.53	\$1.17	\$1.77
Non Residential Energy Efficient ITEE	\$0.01	\$0.46	\$0.50	(\$0.60)
Non Residential Energy Efficient Process Equipment Products	\$0.56	\$0.46	\$0.16	\$0.30

3b. The UCT, also referred to as the Program Administrator Cost Test, reflects the avoided supply costs and the utility's cost to implement the program. A score of greater than 1 indicates that the program is cost-effective. The term "net benefits" refers to program cost savings minus program costs. For example, during 2017, the Non Residential Smart Saver Energy Efficient Lighting Products program cost DEC about \$66.5 million to implement and produced \$200.8 million in system cost savings on a present-value basis, yielding a net benefit of \$134.3 million, as shown in Table 3. South Carolina ratepayers receive approximately one-fourth of system net benefits, based on the jurisdictional allocation between North Carolina and South Carolina.

Non Residential Smart Saver Performance Incentive	-	-	(\$0.03)	(\$0.30)
Small Business Energy Saver	\$2.17	\$36.28	\$42.88	\$55.17
Smart Energy in Offices	(\$0.22)	\$0.28	\$0.86	\$0.23
Business Energy Report	-	(\$0.12)	\$0.05	(\$0.13)
EnergyWise for Business	-	(\$1.52)	\$0.16	\$0.30
PowerShare	\$39.37	\$41.69	\$37.73	\$35.84
Full Portfolio	\$231.87	\$277.00	\$349.39	\$433.49

CCL and SACE support the energy savings and system-cost reductions that have been achieved by the Company's programs; however, sound utility management and regulatory practice require expansion of programs that reduce costs and help all ratepayers lower their bills. As noted in our comments last year, DEC's most recent DSM potential study¹⁴ demonstrated the availability of cost-effective energy savings at a level of 1% annual savings or more for a decade.

CCL and SACE recommend that the Public Service Commission order the development of a Technical Reference Manual ("TRM"). A TRM documents publicly all current assumptions regarding efficiency-measure energy savings, peak-demand savings, savings life, and incremental costs – as well as references for the sources of those assumptions. When evaluation studies indicate that an assumption needs to be updated, the TRM is also updated. The absence of such a single reference document makes it more difficult to review the reasonableness of DEC's savings and net benefits claims.

The vast majority of states – especially those with fairly robust efficiency-program offerings – have TRMs. For example, in the South there are TRMs currently in use in Arkansas (currently on their seventh iteration),¹⁵ New Orleans (currently on its

¹⁴ Nexant Study, *supra* note 12.

¹⁵ <http://www.apscservices.info/EEInfo/TRMv7.0.pdf>.

first iteration),¹⁶ Texas (currently on its fifth iteration),¹⁷ and by TVA (currently on its seventh iteration).¹⁸ TRMs have also been developed and used by utilities in Illinois, Indiana, Michigan, Ohio, Pennsylvania, Missouri, New Jersey, other mid-Atlantic states, New York, the New England states, the Pacific Northwest states, California, and at least half a dozen other states.¹⁹ South Carolina, in cooperation with North Carolina, should follow suit.

A TRM would provide transparency regarding the basis for all utility-savings estimates, as well as other key inputs to cost-effectiveness calculations. That makes it easier for all parties to identify quickly when key assumptions may be outdated and/or when targeted evaluation activity may be needed to update assumptions. That includes assumptions, such as savings life and incremental cost, that are often not addressed by impact evaluations. Such assumptions are important inputs to cost-effectiveness calculations and shareholder-incentive calculations.

DSM/EE PROGRAM RECOMMENDATIONS

A. DEC should address the barrier to higher DSM/EE savings posed by non-residential opt-outs.

As in previous years, the rate of non-residential customers opting out of DEC's DSM/EE programs and rider continued to increase in 2017 and are projected to increase more in 2018. As shown in Table 4, below, the percentage of DEC's non-residential customers who have chosen to opt out of the Company's DSM and EE programs and

¹⁶ No on-line link is available.

¹⁷ <http://www.texasenergy.com/index.php/emv>.

¹⁸ <https://www.tva.gov/Energy/EnergyRightSolutions>.

¹⁹ For a list of jurisdictions with TRMs as of a year ago see U.S. Department of Energy, *SEE Action Guide for States: Guidance on Establishing and Maintaining Technical Reference Manuals for Energy Efficiency Measures*, Evaluation, Measurement and Verification Working Group, June 2017 (https://www4.eere.energy.gov/seeaction/system/files/documents/TRM%20Guide_Final_6.21.17.pdf).

rider has increased. In 2014, the Company reported that 54% of its non-residential sales were to customers that had opted out of DEC's DSM programs. That figure is projected to be 63% in 2018. Similarly, DEC reports that 58% of its non-residential sales were to customers that had opted out of the Company's EE programs and rider. That figure is projected to increase to 70% in 2018.

Table 4. DEC Non-Residential Customers Opting Out of the DSM/EE Rider²⁰

Year	Total non-residential sales (MWh)	DSM opt-outs (MWh)	EE opt outs (MWh)	DSM opt-out %	EE opt-out %
2016	14,934,362	9,247,406	10,201,067	62%	68%
2017	14,886,464	9,247,406	10,327,559	62%	69%
2018	14,765,768	9,312,025	10,399,711	63%	70%

With customers that account for over 60% of DEC's non-residential sales opting out of the Company's DSM programs, and customers that account for about 70% of non-residential sales electing not to participate in its EE programs each year, it is imperative that DEC adopt new strategies and programs to reverse the trend of increasing opt-outs and grow its non-residential energy savings. The Collaborative would be a good venue for developing new strategies for reaching opt-out customers. On the other hand, this level of opt-outs provides an opportunity for DEC to focus on the still-significant percentage of industrial load that has not opted out and to work with those customers to strengthen its tailored offerings for those customers.

At the same time, industrial programs yield very cost-effective energy savings: the levelized cost of saved energy is generally less than three cents per kilowatt-hour (and

²⁰ Rider 10 Application, Exhibit 7.

often less than two cents/kWh).²¹ Utility investments in DSM and EE that pass cost-effectiveness screening can offset the cost of more expensive supply-side investments, thereby reducing total utility revenue requirements. Such investments have the effect of lowering costs for all customers in the medium and long term, regardless of whether they directly participate in the efficiency programs. As noted on Table 3 above, DEC's DSM and EE programs have consistently achieved hundreds of millions of dollars of savings each year, which yield financial benefits to all customers. Were it not for these capacity and energy savings, customers would have to pay considerably more to provide equivalent power through traditional supply resources.²²

DEC's efficiency potential is overwhelmingly located in the non-residential sector. According to Nexant's 2016 study, the industrial sector, even taking current opt-out rates into account, represents 25% of the achievable program potential, and the commercial sector represents 40% under the enhanced scenario.²³ CCL and SACE recommend that DEC work with stakeholders to develop new strategies for overcoming the financial, regulatory, and informational barriers associated with commercial and industrial investment in EE in order to capture this large energy savings opportunity.

DEC should assess the potential to reduce the number of customers who opt out of its programs by improving business customers' understanding of its programs and/or improving the designs of its programs to make them more attractive to such customers.

²¹ SEE Action Network, Industrial Energy Efficiency and Combined Heat and Power Working Group, ["Saving Energy in Industrial Companies: Case Studies of Energy Efficiency Programs in Large U.S. Industrial Corporations and the Role of Ratepayer-Funded Support,"](#) March 2017.

²² DEC response to CCL-SACE DR 1-3am workbook: CCL-SACE DR1-3b.xlsx

²³ Nexant Study at 93, Figure 7-5. To incorporate the impact of opt-outs into the study, Nexant incorporated the current opt-out information for South Carolina into the model by reducing the non-residential sales estimates by the appropriate percentage for each service territory and applying the applicable energy-efficiency technologies and market adoption rates to the remaining sales forecast.

Business customers opt out of efficiency-program offerings (when they have the option) for a variety of reasons. Some of those reasons are outside the control of the utility. Others are not. For example, some business customers opt out because they do not feel that the utility's efficiency-program offerings adequately address their needs. Sometimes this feeling is a function of the business customer's not fully understanding the efficiency programs that the utility offers. Other times, business customers have legitimate concerns about the structure and nature of available program designs. If DEC could improve awareness of how its programs can help business customers while also improving its offerings to better serve customers that are otherwise inclined to opt out, the Company could tap into another source of substantial energy savings. Many of these savings would likely be long-lived and very cost-effective and would further reduce the amount of more expensive supply-side resources the Company would need to procure.

Improved engagement with this class of customers may need to take on a new, tiered approach. For larger industrial customers, the role of DSM/EE programs is usually to assist companies in the rollout and expanded operation of their own programs in different facilities. For medium- and small-scale companies, DEC should look to create EE programs that can offer technical assistance and in some cases, provide financing assistance to overcome time, capacity and capital hurdles. Comprehensive, continuous improvement energy-management process programs like Strategic Energy Management can increase industrial staff capacity and reduce the upfront costs of participation in utility programs. CCL and SACE strongly support a renewed focus on this energy-intensive group of customers and stand ready to work with the Company to help it achieve its energy-savings potential from the non-residential sector.

B. DEC should reevaluate its assumptions about persistent savings from its My Home Energy Report.

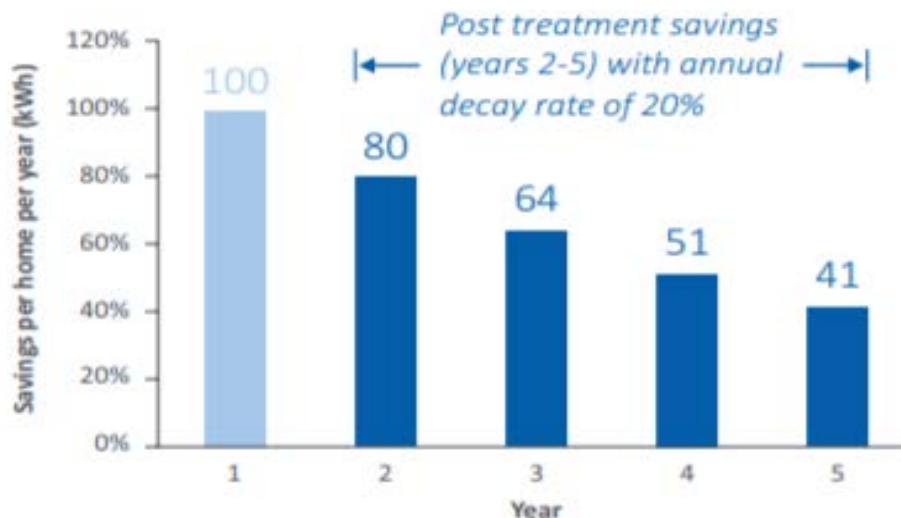
DEC assumes that the savings from the My Home Energy Report last only for as long as participants are receiving the report.²⁴ This assumption leads the Company to conclude that it must provide MyHER mailings to the same customers who received them over the prior year in order to reacquire savings procured from those customers over the previous year. In other words, DEC wrongly assumes that savings expire as soon as customers stop receiving the My Home Energy Reports. As a result, each year, DEC counts the savings from all program participants, regardless of the year in which they started participating, as part of its estimates of the *new* annual savings it is producing each year.

But it is not reasonable to assume that savings vanish immediately once someone stops receiving the reports. A number of studies of residential behavior programs have shown that savings produced from a given year of program delivery do not expire if the program is stopped. Instead, a significant portion of the savings will persist into the years following program termination, though the amount that persists declines over the course of several years. One commonly referenced study suggests that, on average, savings achieved during a program year decay (or decline) by about 20% every year following program termination.²⁵ As the figure on the following page illustrates, that would mean that 80% of the program-year savings persist into the first year following termination of the program, 64% persist into the second year, 51% persist into the third year, and so on.

²⁴ My Home Energy Report Program Evaluation, Nexant (Feb. 16, 2017), Rider 10 Exhibit 5C, p. 70 of 138.

²⁵ Khawaja, Sami and James Stewart, Long-Run Savings and Cost-Effectiveness of Home Energy Report Programs, published by The Cadmus Group, Inc., Winter 2014/2015 (http://www.cadmusgroup.com/wp-content/uploads/2014/11/Cadmus_Home_Energy_Reports_Winter2014.pdf) (“Cadmus Report”).

Cadmus Report, Figure 3: Home Energy Report Savings Persistence with 20 Percent Annual Decay Rate²⁶



As a result, some states have adjusted the way that they estimate savings from such residential behavioral programs. For example, the Illinois TRM now requires electric utilities in the state to assume that 80% of savings achieved in a program-participation year persist into the first year following program termination, 54% into the second year, 31% into the third year, and 15% into the fourth year.²⁷ Thus, if a utility measures annual savings of 100 kWh per participating customer each year, it can only claim 20 kWh of *new* incremental annual savings in the second consecutive year of delivery to the same set of customers.²⁸

²⁶ This is a copy of Figure 3 from the Cadmus Report, *supra* note 24.

²⁷ Illinois TRM Version 6.0, Volume 4, p. 9

(http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_4_X-Cutting_Measures_and_Attach_020817_Final.pdf).

²⁸ Unless savings per customer increase, as they sometimes do after more than one year of participation. For example, if average savings per customer were 100 kWh in the first year and grew to 120 kWh in the second year, the utility could claim 40 kWh of new incremental annual savings per repeat participant, or the difference between the 120 kWh measured in the second year and the 80 kWh that would have persisted into the second year anyway, even if the program was not offered again to the same customers.

Taking into account this persistence of savings should inform delivery strategies for the My Home Energy Report program. First, it significantly reduces the amount of *new* annual savings a utility can count from repeat participants towards any annual savings goals. And because the cost of the program per participant does not change, the cost per unit of *new* annual savings from repeat participants goes up considerably. That, in turn, at least has the potential to make program delivery to repeat participants comparatively more expensive per new annual kWh saved than other programs to which efficiency portfolio budgets can be allocated. Second, it can even render it not cost-effective to deliver the program to repeat participants.

As a result, it may make sense to adjust program design and delivery strategy. One option is to rotate delivery of residential behavior programs to different sets of customers each year, and not return to a group of customers until at least three or four years have passed since they were last treated. That is the strategy that Ameren Illinois has adopted for its 2018-2021 plan. There are undoubtedly other options that merit consideration as well.

Before making programmatic changes, more analysis should be done. It may be appropriate to stop delivering the program for a set of participants, and evaluate savings persistence over time for those participants, in order to refine any changes in assumptions. Finally, it will be important to consider whether and to what extent any changes in assumptions regarding the life of a measure – as well as other concerns discussed further below – support changes to program emphasis and delivery strategy. This is an issue that the Public Service Commission may wish to refer to the DEC

Collaborative for discussion, analysis, and ultimately recommendations on how to proceed.

C. Federal EISA standards will affect residential light bulb savings life.

The evaluation report for DEC's Free LED program assumes that most LED light bulbs have an average life of about 12 years.²⁹ While 12 years could be a reasonable assumption for the equipment life of the bulbs, it is not a reasonable assumption for the average *savings life*. Put another way, multiplying the first-year savings of a standard LED by its assumed 12-year measure life will produce an unrealistically high estimate of lifetime savings for the measure.

An LED light bulb that is purchased today – or next year – is assumed to be purchased instead of a halogen light bulb. The electricity savings produced by an LED in its first year of operation will therefore be equal to the difference between its electricity consumption and that of the halogen that would have otherwise been purchased and installed. In addition to consuming less energy, LEDs last a lot longer than halogens. Depending on the product and other factors, it can be reasonable to assume that LEDs last an average of 12 years.

In contrast, halogens that are replaced by LEDs typically last only a year or two.³⁰ Thus, in the baseline scenario, the customer would be buying a new light bulb roughly every year or every other year, for as long as the baseline product remains a halogen bulb.

²⁹ A 12-year life is the assumption for between 85% and 90% of the light bulbs DEC is forecasting for its 2019 Residential Energy Efficient Appliances and Devices program in North Carolina. The remaining bulbs have an assumed measure-life of 15 years (DEC confidential response to SACE et al Data Request 2-3b). Though the underlying data source for this analysis was from a spreadsheet marked "confidential" by DEC, counsel for the Company has confirmed that no confidential material is included in this summary of the average useful life of lighting measures.

³⁰ Based on review of a variety of screw-based halogen light bulbs for sale from Home Depot (<https://www.homedepot.com/s/halogen%2520light%2520bulb?NCNI-5>).

If it were reasonable to assume that the baseline product would remain a halogen bulb for the next 12 years, the savings in each of the next 12 years of the LED equipment life would be the same as in the first year. In that case, the LED savings life would be equal to the LED equipment life.

But that is not a reasonable assumption for standard LEDs, because federal efficiency standards under the Energy Independence and Security Act (EISA) that will go into effect in 2020 will effectively require all new general service, screw-based lamps – i.e., those that “standard LEDs” would replace – to be as efficient as compact fluorescent light bulbs (CFLs). Thus, the annual savings estimated for standard LEDs will decline significantly starting in 2020. Put another way, rather than assuming that the current annual savings of an LED will last 12 years, the annual savings for an LED installed in 2017 should only be assumed to continue at the 2017 level for three or four years, followed by eight or nine years of much lower levels of savings.³¹ Similarly, for a standard LED light bulb installed in 2019, the current annual savings estimate may be appropriate for only the first year or two of the LED bulb’s physical life, with lower savings assumed for the remaining 10 or 11 years.

But recalculating estimated annual savings in this way is only appropriate for the kinds of light bulbs that are governed by the EISA product-efficiency standards, which include all “standard LEDs,” particularly “A-Line LEDs,” but also likely directional and decorative lamps that are included in a recently expanded definition of “general service lamp” adopted by the U.S. Department of Energy. DEC’s programs may include savings

³¹ Similarly, for a standard LED installed in 2019, the current annual savings estimate would be appropriate for only one or two years, followed by 10 or 11 years of much lower levels of savings. And the savings for any standard LED installed in 2020 or later will be much smaller in every year of its operation (i.e., requiring a lower first-year savings value as well as lower savings in subsequent years).

from both LEDs that are covered by EISA and LEDs that are not. The savings from the LEDs not covered by EISA would be unaffected by the shifting baseline efficiency associated with EISA. We do not know what fraction of the LED light bulbs promoted by all of DEC's programs fall into each category, though at first blush it appears as if all of the bulbs proposed to be promoted in 2019 through its Residential Energy Efficient Appliances and Devices program will be affected by EISA.³²

Changing how savings are calculated is consistent with national best practices. This kind of adjustment has been recommended by the national "Uniform Methods Project," a national effort designed to bring consistent best practices to energy-savings estimation and evaluation:

Bulbs expected to be in use in 2020 and beyond will be affected by the EISA backstop provision mentioned in Section 1. The life cycle savings of CFLs, therefore, should either terminate for any remaining years in the expected life beginning in mid-2020, or be substantially reduced after 2020 to account for the backstop provision. Similarly, the life cycle savings for LEDs should incorporate this upcoming baseline change.³³

Other states, including Illinois and Arkansas, are beginning to make these savings adjustments for standard bulbs. The Illinois TRM explains the LED "mid-life baseline adjustment" as follows:

During the lifetime of a standard Omnidirectional LED, the baseline incandescent/halogen bulb would need to be replaced multiple times. Since the baseline bulb changes over time (except for <300 and >2600+ lumen lamps) the annual savings claim must be reduced within the life of the measure to account for this baseline shift. For example, for 60W equivalent bulbs installed in 2014, the full savings ... should be claimed for the first six years, but a reduced annual savings (...[initial first year

³² This assumption is based on a review of product types listed in DEC's Excel attachment to its confidential response to SACE 2-3b.

³³ Dimetrosky, Scott, Katie Parkinson and Noah Lieb, "Chapter 21: Residential Lighting Evaluation Protocol," The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, published by the National Renewable Energy Laboratory, February 2015, <http://energy.gov/sites/prod/files/2015/02/f19/UMPCChapter21-residential-lighting-evaluation-protocol.pdf>.

energy savings] ... multiplied by the adjustment factor in the table below) claimed for the remainder of the measure life

Minimum Lumens	Maximum Lumens	LED Wattage (WattsEE)	Delta Watts 2014-2019 (WattsEE)	Delta Watts Post 2020 (WattsEE)	Mid Life adjustment(made from June 2020) to first-year savings
1490	2600	37.2	34.8	8.3	23.8%
1050	1489	23.1	29.9	5.1	17.1%
750	1049	16.4	26.6	3.6	13.5%
310	749	9.6	19.4	2.1	10.8%

Source: Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 5.0, Volume 3: Residential Measures, Final; February 11th, 2016; effective June 1st, 2016; p. 261.³⁴

As is evident from the table above, the portion of initial LED savings that no longer apply after 2020 varies by lamp light output level. The average remaining savings across the four categories shown is 16%, representing an 84% reduction from pre-2020 annual savings levels.

The Arkansas TRM uses the same conceptual approach, but with slightly different assumptions. Specifically, it assumes that the baseline shift for standard LEDs does not change until 2022 instead of after 2020, so it assumes that there are more years of higher levels of savings and fewer years of lower levels of savings.³⁵ That difference is a function of different assumptions regarding the average life of a current baseline halogen lamp.

³⁴ http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_5/Final/IL-TRM_Effective_060116_v5.0_Vol_3_Res_021116_Final.pdf.

³⁵ Arkansas Public Service Commission, Arkansas Technical Reference Manual, Version 7.0, Approved in Docket 10-100-R, filed 8/31/2017 (<http://www.apscservices.info/EEInfo/TRMv7.0.pdf>).

The EISA-driven baseline shift, by definition, does not affect estimated first-year savings from LEDs, at least not until 2020, when the prohibition on sale of products not meeting EISA standards goes into effect. However, because it affects estimated savings for a significant portion of the assumed physical life of the average LED governed by such standards, it will reduce estimates of the net economic benefits of such light bulbs.

These new efficiency standards do not require an adjustment to DEC's application in this proceeding. There are several issues that should be worked out in detail before making adjustments to DEC's economic net-benefit calculations, including the nature of the specific baseline shifts to be made, assumptions regarding the products for which they should be made,³⁶ assumptions regarding the assumed life of the average halogen baseline lamp being displaced today (the longer the halogen life, the longer the average period before the baseline shift occurs), etc.

Regardless, this is an important issue for a measure that accounts for a significant portion of DEC's estimated annual savings. Thus, as with the issue of the My Home Energy Report program savings decay/persistence, the Public Service Commission should consider referring this issue to the DEC Collaborative for discussion, analysis, and ultimately recommendations on how to proceed.

D. Too much reliance on behavior programs

Data from the American Council for an Energy Efficient Economy's (ACEEE's) 2017 Utility Energy Efficiency Scorecard, which rated the efficiency performance of 51 utilities across the country, also suggest that the average savings life of DEC's efficiency

³⁶ The U.S. Department of Energy's expanded definition of general service lamp is being challenged by some parties. While it appears likely to withstand such challenges, it may be appropriate to assess that likelihood thoroughly before making definitive decisions regarding the products for which adjustments should be made.

programs is much lower than average. Specifically, though DEC's average *annual* savings was only just below average for the 51 utilities analyzed, its average *lifetime* savings was only about half of the average lifetime savings achieved by those 51 utilities.³⁷

CCL and SACE are unaware of any other investor-owned electric utility (other than DEC's affiliated company, Duke Ohio) that is planning to get that much of its total savings from a residential behavior program. To illustrate this point, Chris Neme of the Energy Futures Group compiled estimates of the percentage of both residential and total savings that residential-behavior programs provide for 19 electric utilities in the eastern half of the United States, including nine Southern utilities. Though not an exhaustive review, it includes data for the largest utilities in most Southern, mid-Atlantic, and Midwestern states. Those estimates are provided in Table 5 below.

³⁷ Relf, Grace et al., 2017 Utility Energy Efficiency Scorecard, ACEEE Report U1707, June 2017.

Table 5. Percentage of Total Savings from Residential Behavior Programs³⁸

Utility	State	Plan or Actual	Year	MWh Savings			Behavior Savings %	
				Res. Behavior Program	All Res. Sector Programs	All Programs, All Sectors	% of Res. Sector Savings	% of Total Savings (All Sectors)
Duke Energy Carolinas	NC/SC	Plan	2019	312,934	451,520	778,508	69%	40%
Entergy New Orleans	LA	Plan	2019	8,000	19,416	53,894	41%	15%
Entergy Gulf States	LA	Actual	2017	0	10,419	17,057	0%	0%
Entergy Louisiana	LA	Actual	2017	0	18,101	28,456	0%	0%
Entergy Mississippi	MS	Actual	2017	0	13,227	26,294	0%	0%
Mississippi Power	MS	Actual	2017	3,421	7,611	18,333	45%	19%
Entergy Arkansas	AR	Actual	2017	7,901	104,051	264,992	8%	3%
SWEPCO	AR	Actual	2017	0	12,617	33,667	0%	0%
Georgia Power	GA	Actual	2017	12,366	94,119	375,375	13%	3%
Florida Power and Light	FL	Actual	2017	0	23,600	71,400	0%	0%
PEPCO	MD	Plan	2019	48,710	130,189	262,357	37%	19%
Baltimore Gas & Electric	MD	Plan	2019	138,200	335,267	500,267	41%	28%
PECO	PA	Plan	2016-20	304,999	844,412	2,091,301	36%	15%
All MA Utilities	MA	Actual	2016	140,547	723,392	1,569,661	19%	9%
Commonwealth Edison	IL	Plan	2018	275,502	575,606	1,619,028	48%	17%
Ameren Illinois	IL	Plan	2018	6,290	92,971	347,176	7%	2%
First Energy	OH	Plan	2017-19	125,788	632,302	1,781,833	20%	7%
American Electric Power	OH	Plan	2019	75,000	212,600	611,500	35%	12%
DTE	MI	Plan	2019	73,668	291,013	702,850	25%	10%
Consumers Energy	MI	Plan	2019	31,442	157,846	479,471	20%	7%
Avg of Southern Utilities	Various	Mix	Mix				12%	4%
Avg of All Utilities	Various	Mix	Mix				21%	9%

Where possible, Table 5 provides planned numbers to compare to DEC's plan for 2019; otherwise the table provides actual performance numbers for a recent year (mostly 2017). None of these utilities come close to achieving as large a portion of total electric portfolio savings from their Residential Behavior programs as does DEC, which projects that 40% of its overall savings in 2019 will come from the My Home Energy Report program. In fact, the average non-DEC utility is getting only 9% of total portfolio electric savings from its residential behavior programs – less than one-quarter as much as DEC – and the average of the other southern utilities for which data were obtained is even less. Only

³⁸ All values are from publicly available sources, either filed utility plans or utility annual reports. Specific references are available upon request.

one utility – Baltimore Gas & Electric – is planning to get even half as much of its savings from its Residential Behavior program as DEC.³⁹

E. DEC should offer new and enhanced residential programs.

To increase savings, DEC should expand and enhance existing programs, develop new programs, and target customer segments that remain relatively untapped.

Specifically, CCL and SACE make the following recommendations:

1. Increase participation in existing rebate programs.

DEC should significantly increase the number of customers participating in rebate offers for high-efficiency heat pumps, central air conditioners, heat-pump water heaters, pool pumps, attic insulation, air sealing, and duct sealing. There should be significant savings potential from these measures as they address the largest electricity end-uses in homes.

However, DEC's Residential SmartSaver Energy Efficiency Program – the program through which all of these measures are promoted – is forecast to produce only about 1% of the Company's annual residential savings in 2019. Participation rates for these measures could potentially be increased in a variety of ways. In short, though DEC includes many of the major residential measures with big savings potential in its program, investment and participation in those measures fall far below potential and greatly limit total savings achieved by the portfolio.

Perhaps most notably, they could be dramatically increased by moving some of the measure incentives (e.g., those for heat pumps, central air conditioners, and heat

³⁹ The 28% provided in Table 5 for BG&E includes only efficiency programs designed to promote efficiency actions by customers. BG&E also gets significant customer savings, from conservation voltage regulation (CVR), that were not included in the total savings into which their total residential-behavior program savings were divided. If CVR savings were included, the BG&E average would drop to 21%.

pump water heaters) upstream to distributors, as the Company has recently done for a number of non-residential prescriptive incentives. Utilities that have made such transitions have achieved dramatic increases in participation. For example, United Illuminating in Connecticut saw a more than six-fold increase in participation in its heat pump water heater rebates when it moved rebates upstream to distributors.⁴⁰ Changes in rebate levels, marketing strategies, paperwork requirements, options for financing investments (for example, through on-bill financing), and/or other program elements may also boost participation.

In addition, the Company could increase longer-lived savings through greater promotion of whole-building retrofits, for residential and, potentially, small business customers too. Such whole-building retrofits should include both (A) improvements to building envelopes (e.g. insulation and air-leakage reduction), and (B) retrofitting efficient heat pumps in single-family and multi-family homes currently using inefficient electric-resistance heat. There may be a large number of such inefficient electrically heated housing units.⁴¹ The energy savings from these measures have the dual benefit of providing lasting reductions to both summer and winter peaks on the utility system.

⁴⁰ Jennifer Parsons (UI, SCG and CNG), “Energize Connecticut Upstream Residential HVAC Program,” presented at the 2015 ACEEE National Conference on Energy Efficiency as a Resource in Little Rock, Arkansas, September 2015.
http://aceee.org/sites/default/files/pdf/conferences/ee/2015/Jennifer_Parsons_Session4A_EER15_9.22.15.pdf.

⁴¹ Statistics specific to DEC’s North Carolina service territory are not available. However, 62% of North Carolina homes use electricity as their primary heating fuel [U.S. Census, Selected Housing Characteristics, 2012-2016 American Community Survey 5-Year Estimates, <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>]. Census data also suggest that more than half of electrically heated homes in the South Atlantic region rely upon some form of electric-resistance heating system, whether a furnace, electric baseboard, or portable electric heaters (U.S. Energy Information Administration, Residential Energy Consumption Survey, Table HC6.8: “Space heating in homes in the South and West Regions, 2015,” <https://www.eia.gov/consumption/residential/data/2015/#sh>).

2. A comprehensive home energy retrofit program based on industry best practices would deepen savings.

A well-performing, comprehensive, home-energy-retrofit program often delivers average electricity usage reductions of 20% or more per home, helping customers reduce bills. Absent such a program, customers are unlikely to undertake comprehensive home retrofits due to high upfront costs, information barriers, and time constraints, even where such retrofits are cost-effective. These programs can deliver deep, long-term energy savings and benefits, including substantial cost savings, increased comfort, better indoor air quality, and overall customer satisfaction.

The DEC home retrofit program with the broadest eligibility, HVAC Energy Efficiency, achieved less than 1% of overall portfolio savings and was heavily weighted in replacement HVAC measures. Although it is not currently promoted as a comprehensive whole-home program, the Nexant potential study indicated that 34% of the potential in the five-year enhanced scenario should be coming from the Company's HVAC EE ("SmartSaver") program, which provides air sealing, duct sealing, and insulation, in addition to HVAC measures, justifying additional marketing support of this underutilized program.⁴²

Whole-home retrofit programs have proven successful for DEC's peers in other Southern states. Arkansas provides a notable example. In 2015, Southwestern Electric Power Company ("SWEPCO") achieved 19% of its efficiency portfolio savings in Arkansas from comprehensive, residential home-energy-services programs, including a

⁴² Nexant Study at 97. Nexant refers to the HVAC EE program as the "SmartSaver" program in its study.

highly cost-effective Home Performance with Energy Star (“HPwES”) program.⁴³ In 2015 and 2016, SWEPCO garnered national recognition as a leading HPwES program manager. Likewise, Arkansas’ largest utility, Entergy Arkansas, Inc., achieved 10% of its entire 2015 efficiency portfolio savings through its residential Home Energy Solutions program, which provides diagnostic testing, air sealing, duct sealing, insulation, and HVAC measures.⁴⁴

Entergy Arkansas did require some time to get its whole-home efficiency program off the ground. The utility tried different rebate and contractor-management approaches, but did not abandon the effort, and today services more than 3,000 homes annually, achieving \$5 million to \$10 million in net benefits each year.⁴⁵ Beyond the immediate cost savings for utility purposes, the presence of substantial, successful whole-home efficiency programs for the largest utilities in Arkansas has developed a robust market of skilled home-energy professionals who advance home performance statewide.

Successful whole-home retrofit programs have also used on-bill financing as a mechanism to address the upfront cost of major efficiency upgrades. These include the Help My House! pilot program implemented by the Electric Cooperatives of South Carolina, the Roanoke Electric Upgrade to \$ave program, and the HELP Pay-As-You-Save (“PAYS®”) program at Ouachita Electric in Arkansas.

⁴³ SWEPCO’s HPwES program had a UCT score of 2.10 and a TRC score of 1.26 in 2015. SWEPCO Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2015, <http://www.apscservices.info/eeAnnualReports.aspx>.

⁴⁴ The program UCT score was 1.74, and the TRC score was 2.44. Entergy Arkansas Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2015, <http://www.apscservices.info/eeAnnualReports.aspx>.

⁴⁵ Entergy Arkansas Energy Efficiency Program Portfolio Annual Report and Workbook, Program Year 2013-2015, available at <http://www.apscservices.info/eeAnnualReports.aspx>.

Tariffed on-bill financing programs, such as HELP PAYS® and Upgrade to \$ave, have also met the needs of low-income customers, because the utility covers the upfront costs of the efficiency upgrades and the program is designed to save customers money on their electric bills at the outset. In addition, unlike other whole-home retrofit programs, tariffed on-bill financing can serve renters as well as owner-occupiers. Such programs increase the total number of customers able to participate and address equity issues for low-income customers who pay for efficiency programs through their monthly bills but may otherwise be unable to benefit from direct participation. We recommend that DEC continue to work with the Collaborative to develop on-bill programs for residential and non-residential customers as a means to encourage comprehensive home and commercial building retrofits.

3. Additional low-income EE programs would ease the energy burden on low-income customers while improving comfort, safety and health.

It is important for DEC's energy-efficiency portfolio to include an expanded focus on low-income customers, who are generally less likely to participate in programs marketed to the residential sector as a whole. Such programs usually offer financial incentives to defray, but not totally eliminate, the incremental cost of efficiency measures. Low-income customers rarely have the financial means to make any contribution to efficiency-measure costs. Many are renters, and therefore face greater barriers to participation in efficiency programs than do home owners.

Second, low-income customers need energy-efficiency improvements more than other customers, because they must spend a much higher portion of their income on energy than do non-low-income customers. In addition, because of their limited means,

paying their energy bills can force trade-offs with other necessities of life, like food and health care.

Robust EE programs for low- and fixed-income households are essential to ensure that all customers are able to afford basic utility service. According to a 2016 Home Energy Affordability Gap study, there are about 143,600 South Carolina households with an income less than 50% of the Federal Poverty Level (“FPL”). These households spend on average a staggering 25% of their income on energy bills—a far greater percentage than those households at 185 to 200% of the FPL, who spend an average of 5% of their income on energy.⁴⁶ And about 172,500 additional South Carolina households live with incomes between 50% and 100% of the FPL and spend approximately 13% of their income on energy.⁴⁷

DEC’s only program specifically marketed to low-income customers, the Income Qualified EE and Weatherization Assistance Program, achieved 5 GWh of savings in 2016, or only 0.55% of DEC’s total EE portfolio savings. In 2016, the Neighborhood Energy Saver portion of the program installed lighting and water fixtures in 13 qualifying neighborhoods (four in South Carolina), serving a total of 8,500 of DEC’s customers. A billing analysis prepared by Opinion Dynamics for the 2015 vintage year revealed 347 kWh of net savings per participant.⁴⁸ Coupled with the weatherization assistance and new appliance portions of the Income Qualified program, there is substantial opportunity

⁴⁶ Fischer, Sheehan and Colton, 2017 Home Energy Affordability Gap, http://www.homeenergyaffordabilitygap.com/03a_affordabilityData.html.

⁴⁷ *Id.*

⁴⁸ Opinion Dynamics, DEC 2015 Residential Neighborhoods Program Evaluation Report-Final, December 7, 2016.

for DEC to provide additional energy savings assistance for this vulnerable customer class.

In addition to energy savings, low-income energy-efficiency programs have significant non-energy benefits (“NEBs”), which are often unaccounted for. These benefits include fewer disconnections and arrearages on utility bills; improved health, safety and comfort; increased productivity; environmental benefits; economic development; and job creation. It is essential to recognize NEBs in screening programs for cost-effectiveness, particularly for low-income programs. In order to value all energy savings appropriately, CCL and SACE recommend that DEC work with the Collaborative to develop values for the NEBs associated with low-income programs and to evaluate new programs with this more robust evaluation framework moving forward.

A potential first step is to quantify the cost of involuntary disconnections. According to DEC’s recent filing, over 13,000 accounts in its South Carolina service territory were disconnected for non-payment in the first quarter of 2018 alone.⁴⁹ Because of their financial constraints, low-income households are generally more likely to have problems paying their bills. DEC, like all utilities, incurs costs managing relationships with customers with bill-payment problems. To the extent that low-income efficiency programs can lower such costs, there are added utility-system benefits that do not accrue to other programs (at least not to the same level).

CCL and SACE also recommend that DEC explore the idea of working with community partners such as the South Carolina Association of Community Economic Development Corporations (“SCACED”) to implement low-income and residential

⁴⁹ DEC, Quarterly Reports on Involuntary Termination of Electric and/or Gas Service, Report for the Fourth Quarter of 2016, Docket No. 2006-193-EG.

energy-efficiency programs. For example, DEC could enter into program partnerships or arrangements between itself and one or more other energy utilities, local governments and/or community organizations to implement an energy-efficiency program.

Partnerships typically identify specific contributions and roles for each of the parties involved that, when applied to the program, may improve program delivery, participation, and energy savings beyond a utility-only program.⁵⁰ In direct communications with CCL and SACE, SCACED has indicated interest in potentially acting as a partner in such a program.

For example, a new residential, whole-building retrofit program could be targeted first to electrically heated low-income neighborhoods⁵¹ and/or offered with a tiered incentive structure, with income-eligible customers receiving the retrofit services for free, when necessary to enable them to participate.⁵² Depending on capabilities, relationships, and other factors, such a program could even be delivered on DEC's behalf by community action agencies (CAAs) that already perform low-income home retrofits using federal and/or state dollars. DEC already has experience with this kind of partnership from its investment in the Helping Home Fund.⁵³

CCL and SACE recommend that the Commission direct the Collaborative to analyze the Helping Home Fund for cost-effectiveness and determine whether any

⁵⁰ Eric Mackres et al., The Role of Local Actors as Energy Efficiency Implementation Partners: Case Studies and a Review of Trends, 3 (2012), <http://www.aceee.org/white-paper/the-role-of-local-actors>.

⁵¹ Although, for equity reasons, there would be value to targeting such a program offering initially to electrically heated, low-income customers, such a program should ultimately aim to offer all cost-effective opportunities, over time, for all customers, regardless of income.

⁵² There can be situations, particularly in the case of multi-family buildings, where it may not be necessary to offer efficiency upgrades for free (e.g., where building owners are paying the energy bills and/or when building owners see enough value in lowering energy costs, reducing turnover rates, etc., that they are willing to bear a portion of the cost).

⁵³ Evaluation of Duke Energy's Helping Home Fund, Advanced Energy (Oct. 15, 2017).

aspects of the program could serve as a model for an additional DSM/EE program offering.

There are a variety of other options that could also be considered. Later this year, Commonwealth Edison will launch a pilot program promoting heat-pump retrofits exclusively in electric-resistance-heated, low-income, multi-family buildings in the Chicago area.⁵⁴ These programs could be models for similar DEC initiatives in the future.

4. Enhanced multi-family programs could yield big savings in a largely untapped sector.

DEC's existing multi-family program achieved 19 GWh of savings in 2017—3.8% of total residential savings. There is significant room for improvement in this largely untapped market.

According to its most recently updated EM&V report, DEC completed installations of efficient lighting and water-saving measures in 262 multi-family properties, accounting for nearly 22,000 units.⁵⁵ According to the program manager, lighting measures account for approximately 50% of the measures installed, and water fixtures the other 50%. With more than 148,000 affordable housing units and 271 GWh of maximum achievable potential by 2034 in DEC's North Carolina territory alone,⁵⁶ there is likely significant untapped efficiency potential in South Carolina as well. The Nexant potential study indicates that residential multifamily programs have the potential

⁵⁴ Illinois Commerce Commission, Order, Docket 17-0312, September 11, 2017 <https://www.icc.illinois.gov/docket/files.aspx?no=17-0312&docId=256554>.

⁵⁵ EM&V Report for the Duke Energy Multifamily Energy Efficiency Program, Navigant (revised June 27, 2017), p. 6 of 45. Rider 10, Exhibit 5D.

⁵⁶ Optimal Energy, Final Report: Potential for Energy Savings in Affordable Multifamily Housing (2015), <http://energyefficiencyforall.org/sites/default/files/EEFA%20Potential%20Study.pdf>.

to reduce summer peak demand in South Carolina by up to 18 MW and winter peak demand by up to 28.6 MW.⁵⁷

As a general matter, DEC also needs to make more of its program offerings available to renters. In rental properties, including in multi-family buildings where tenants pay the energy bills, there is what is commonly known as a split-incentive problem. Specifically, the party who incurs the costs of making any major investments in building envelop, HVAC, and appliance-efficiency measures – the landlord – is not the party who will see the resulting savings on energy bills – the tenant. Well-designed utility programs can overcome this split-incentive.

By developing a comprehensive multi-family program that goes beyond lighting and water measures, the Company could expand the reach of its efficiency portfolio in a critical housing market. These measures should include Energy Star appliances, weatherization, and upgraded HVAC. In addition, improvements to common areas should be included as part of a multi-family retrofit. Programs like on-bill financing can help overcome the landlord-tenant split incentive. We recommend that DEC discuss this topic in future Collaborative meetings, with particular attention to the needs of the multi-family affordable housing market.

5. There is significant opportunity to improve the efficiency of manufactured housing in South Carolina.

According to the 2010 U.S. Census, there are more than 360,000 manufactured and mobile homes in South Carolina, many of which were built before 1976, when consistent building codes were put in place. In DEC's North and South Carolina territory, it is estimated that there are almost 220,000 manufactured homes. Although

⁵⁷ Nexant Study.

these homes may qualify for some of DEC's DSM and EE programs, the needs of this market are much different from those of single family stick-built homes and require a different skill set from contractors.

Manufactured homes built before 1976 are the least energy-efficient in the United States housing stock and often have leaky ductwork, rotting (or nonexistent) belly board, poor insulation, and inefficient heating appliances. In addition, manufactured homes are a major source of unsubsidized housing for low-income households, which generally have a disproportionality high energy burden and no access to low-cost capital to fund improvements and/or replacement.

Entergy Arkansas is currently running a program weatherizing manufactured homes, 37% of which were occupied by low-income households and another 29% either "likely" to be or "potentially" low-income.⁵⁸ That program had a remarkable 8.56-to-1 TRC benefit-to-cost ratio in 2017.

A multi-tiered manufactured home program could include a variety of solutions to address this energy efficiency need:

1. Replacement program – target pre-1976 homes with an EnergyStar certified replacement.⁵⁹
2. Heat pump replacement program - target homes that are at least 10-15 years old with electric furnace and weatherization as needed. Successful programs have used on-bill financing to assist homeowners with the upfront cost.⁶⁰
3. New manufactured home incentive program - target new home buyers with an incentive to invest in Energy Star manufactured homes.⁶¹

⁵⁸ Energy Arkansas, Arkansas Energy Efficiency Program Portfolio Annual Report, Docket No. 07-085-TF, 2017 Program Year, May 1, 2018 (<http://www.apservices.info/EEInfo/EEReports/Entergy%202017.pdf>).

⁵⁹ Examples include New York [Mobile and Manufactured Home Replacement Program](#) and the Vermont Housing & Conservation Board (VHCB) [Modular Housing Innovation Project](#) (MHIP).

⁶⁰ Examples include French Broad EMC's [Mini-Split Heat Pump Program](#).

⁶¹ Examples include Grayson Rural Electric Co-op's [Manufactured Home Program](#).

F. Improvements to the DEC Collaborative.

As noted above, CCL and SACE recommend a number of items that the DEC Collaborative should analyze and review before next year's DSM/EE filing. To achieve those goals, we recommend improvements to the Collaborative to help it function at a higher level. Though we recognize that the Commission cannot effectively order an enhanced working relationship, directing the Collaborative to take some of these concrete steps can foster more cooperation. As parties work together under this kind of framework, experience from other states suggests that they can better appreciate other perspectives and are better able to identify compromises that can work for everyone.

- **More frequent meetings:** In order to get substantive work done, the collaborative should meet at least eight to 10 times a year (almost monthly) for larger group discussions, with more numerous sub-group working sessions focused on specific topics (for example, examining and analyzing a particular program design or developing a TRM).
- **Shared agenda-setting:** It is important for all parties to be included in establishing priorities for discussion, including specific meeting agendas.
- **Independent facilitation:** An independent facilitator ensures that all voices are heard, including in setting agendas for meetings, and enables participants in the Collaborative to focus on the topic at hand rather than the actual running of meetings. Outside facilitators have been hired to manage the collaborative process in Illinois, Arkansas, and Michigan, and has helped to make the work more effective.

- **Institutionalization of working processes:** This starts with simple things like establishing a schedule for meetings and what those meetings will cover; distributing agendas; and distributing meeting notes, summaries of agreements/ disagreements, and lists of next steps. All of these steps must be taken with enough advance notice for parties to be able to prepare and participate in the meetings meaningfully. Over time, more formal processes should be developed (e.g., annual processes for reviewing and updating and documenting savings assumptions – ideally in a TRM).
- **Accountability:** Collaborative groups that function well are expected to produce results and to report back to regulators, increasingly in the form of consensus filings, on progress made on key issues.

CONCLUSION

In conclusion, CCL and SACE generally support DEC's request for approval of Rider 10. But some of its assumptions and program delivery will need to be updated before next year's filing. In particular, DEC should work with the Collaborative to take into account (1) the persistence of savings from the My Home Energy Report for periods of time after participants receive the report, and (2) the imminent changes to federal efficiency standards for light bulbs. In addition, CCL and SACE recommend developing a Technical Resource Manual. There still exists tremendous potential for EE in DEC's South Carolina territory, including in vulnerable low-income communities and in the largely untapped non-residential sector. DEC has not yet laid out plans to tap this EE potential by filling the gaps in its portfolio.

In order for the Company to improve its energy savings, CCL and SACE recommend that the Company work with the Collaborative on new programs based on best practices from around the country, including comprehensive whole-house retrofit programs, an enhanced multi-family affordable housing program, a manufactured housing program, and additional lower-income residential EE programs.

Finally, CCL and SACE recommend specific ways that the Collaborative could run more effectively to accomplish the above recommendations.

Respectfully submitted this 27th day of June, 2018

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CERTIFICATE OF SERVICE

I certify that the following persons have been served with a copy of the foregoing
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This 27th day of June, 2018.

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